WRI INDONESIA

Opportunities and Challenges for Mangrove Restoration within Protected Areas :

A Preliminary Study of Berbak Sembilang National Park

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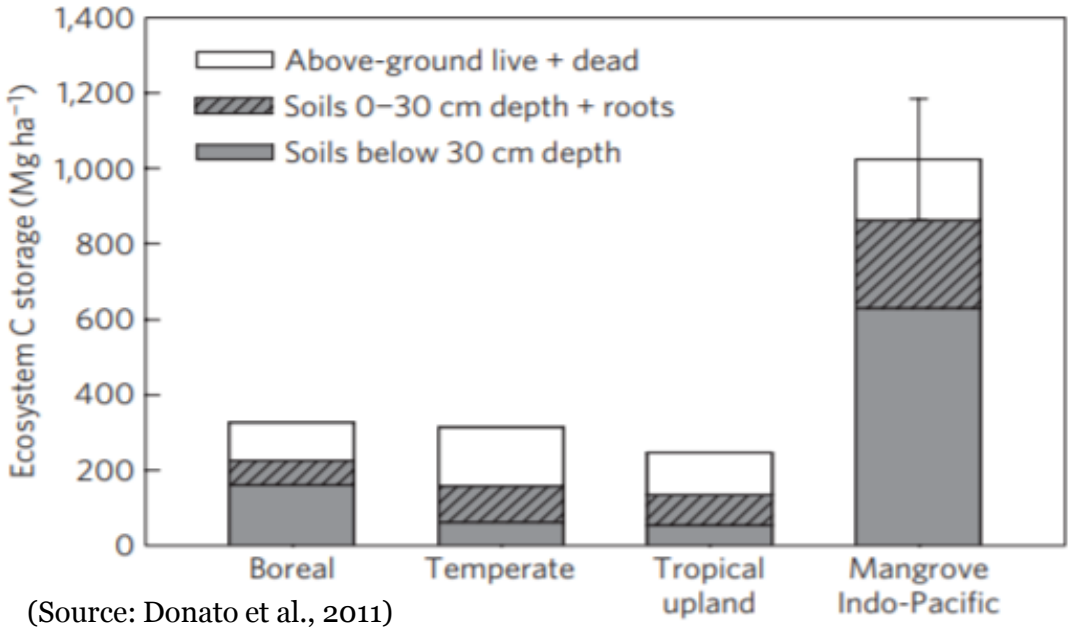
Photo: WRI Indonesia

MANGROVE ECOSYSTEM

- Mangrove ecosystem stores more carbon compare to other forest (Donato et al., 2011).
- The ecosystem functions as a protector against sea water intrusion, abrasion (Khairuddin et al., 2016), and tsunamis (Alongi, 2008).

SN	Country	Area (ha)	% of global total	Cumulative %	Region
1	Indonesia	3,112,989	22.6	22.6	Asia
2	Australia	977,975	7.1	29.7	Oceania
3	Brazil	962,683	7.0	36.7	South America
4	Mexico	741,917	5.4	42.1	North and Central America
5	Nigeria	653,669	4.7	46.8	Africa
6	Malaysia	505,386	3.7	50.5	Asia
7	Myanmar (Burma)	494,584	3.6	54.1	Asia
8	Papua New Guinea	480,121	3.5	57.6	Oceania
9	Bangladesh	436,570	3.2	60.8	Asia
10	Cuba	421,538	3.1	63.9	North and Central America
11	India	368,276	2.7	66.6	Asia
12	Guinea Bissau	338,652	2.5	69.1	Africa
13	Mozambique	318,851	2.3	71.4	Africa
14	Madagascar	278,078	2.0	73.4	Africa
15	Philippines	263,137	1.9	75.3	Asia

(Source: Giri et al., 2010)



(Source: Donato et al., 2011)

- Indonesia is the most mangrove rich country having 22.6% of the world's (Giri et al., 2010).
- The country lost 40% of its mangrove between the 1970s and 2000s years (FAO, 2007), has the fastest rate of mangrove deforestation in the world (Campbell & Brown, 2015).

WHY PROTECTED AREA (PAs) ?

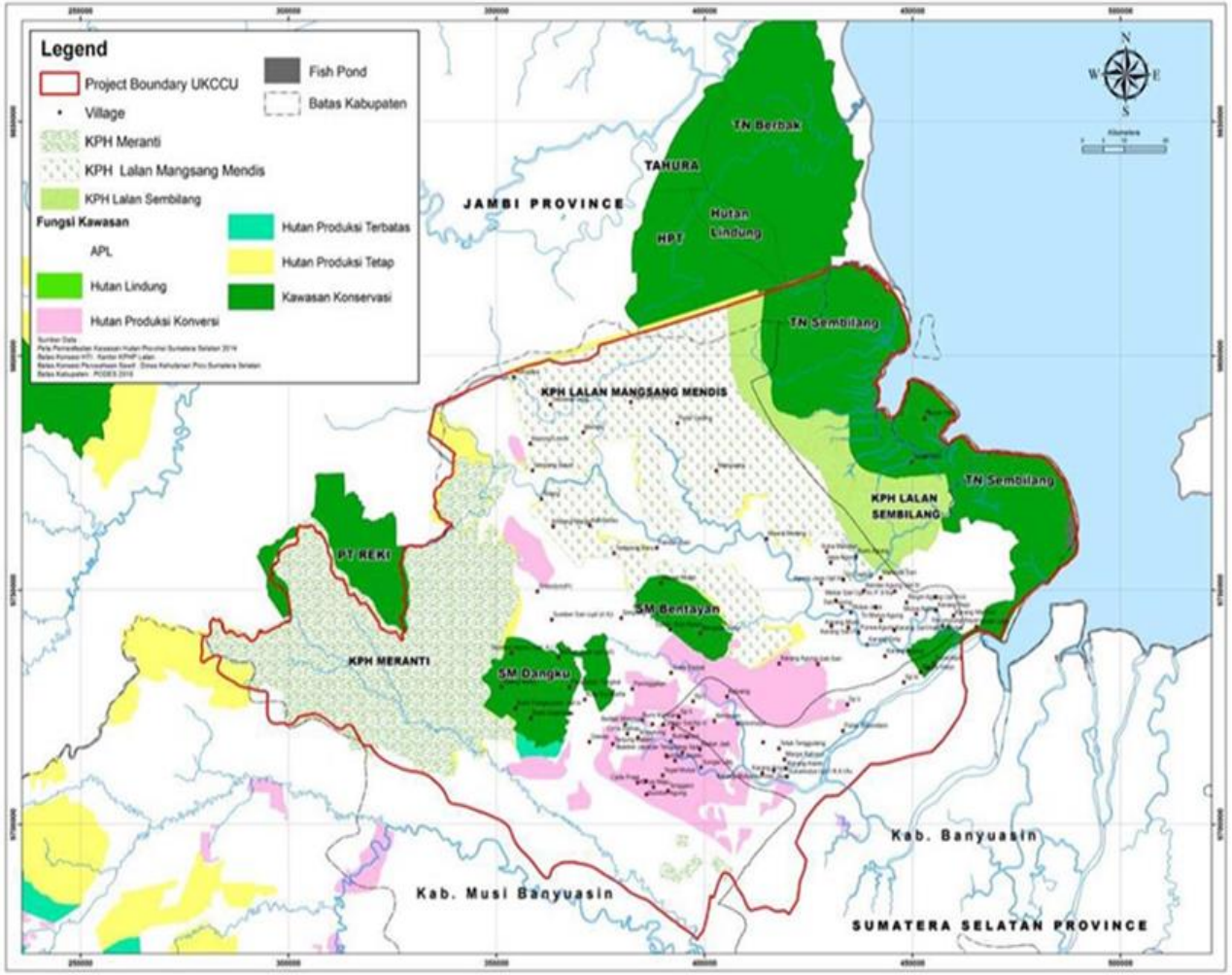
PA impacts mangrove area change (as a fraction of the original mangrove area in the protected zones). Negative values indicate reduction in mangrove loss.

Treatment	2000–2006			2000–2010		
	Mean treated	Mean control	Bias adj. ATT	Mean treated	Mean control	Bias adj. ATT
All PAs	−0.06	0.08	−0.10** (0.05)	−0.11	−0.06	−0.06* (0.03)
	[332, 276, 2771]			[355, 298, 3047]		
All MPAs	−0.08	0.02	−0.13* (0.07)	−0.14	−0.05	−0.09** (0.04)
	[209, 175, 254]			[221, 186, 2798]		
All SMAs	0.08	0.11	−0.02 (0.11)	0.05	0.01	0.06 (0.05)
	[47, 41, 2540]			[51, 46, 2798]		

Standard errors reported below ATT in parentheses.
The number of 'treatment' PA villages, number of match 'control' PA villages and population of potential 'control' villages are given in the square brackets.
* Significance level 10%.
** Significance level 5%.
*** Significance level 1%.
(Source: Miteva, et al, 2015)

- PAs reduced mangrove degradation rates — on average, 10% reduction in mangrove loss from 2000 to 2006
- This equals to avoided blue carbon emission of approximately 13 million metric tons
- Negative impacts of PAs on mangrove loss are even smaller if we consider a longer time span from 2000 to 2010

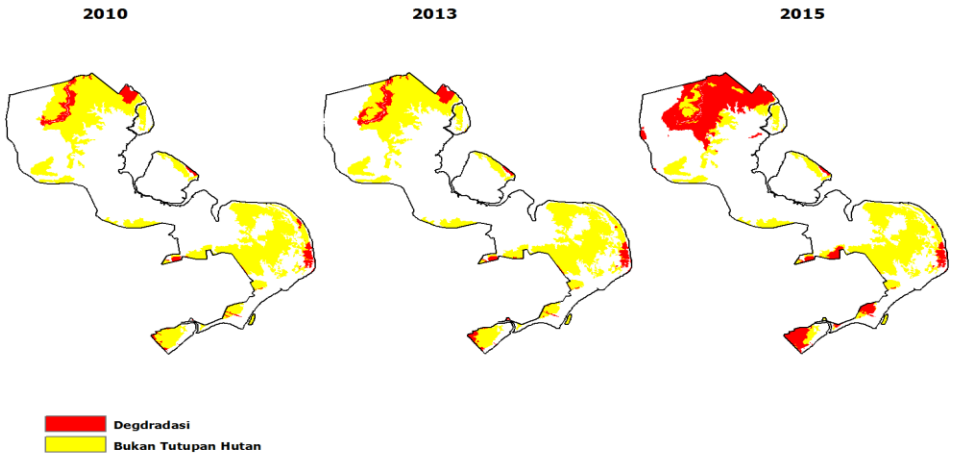
PROTECTED AREA MANAGEMENT IN BERBAK SEMBILANG NATIONAL PARK

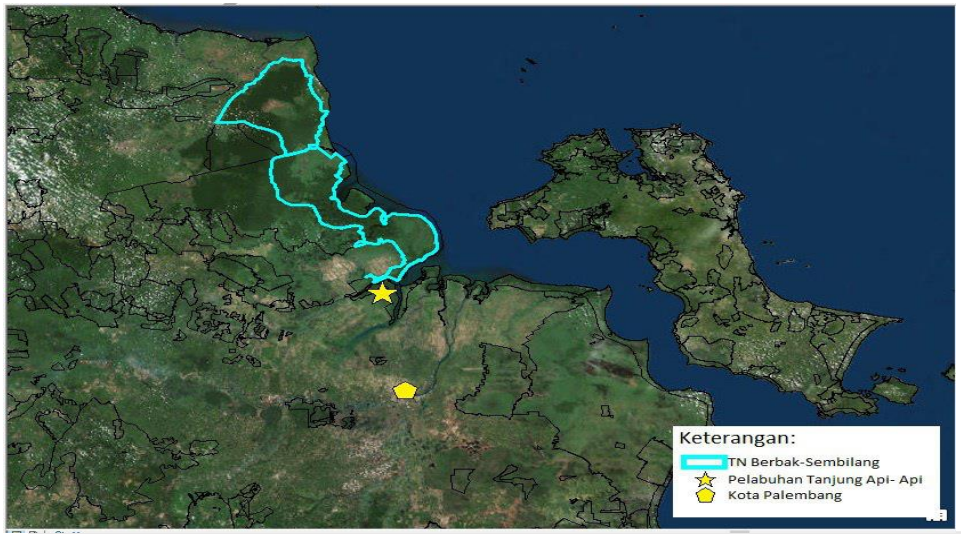


(Source: TFCA Sumatera Tropical Forest Conservation Action)

- Sembilang was gazetted in 2003 as a National Park due to its rich mangrove ecosystem and high fisheries potential, covering 202.896,31 ha
- In 2011, TN Sembilang was designated as a Ramsar site. Previously, TN Berbak was designated as a Ramsar site in 1992.
- TN Berbak-Sembilang is important internationally as a wetland ecosystem and waterfowl habitat.

MANGROVE DEGRADATION IN SUNGAI SEMBILANG NATIONAL PARK





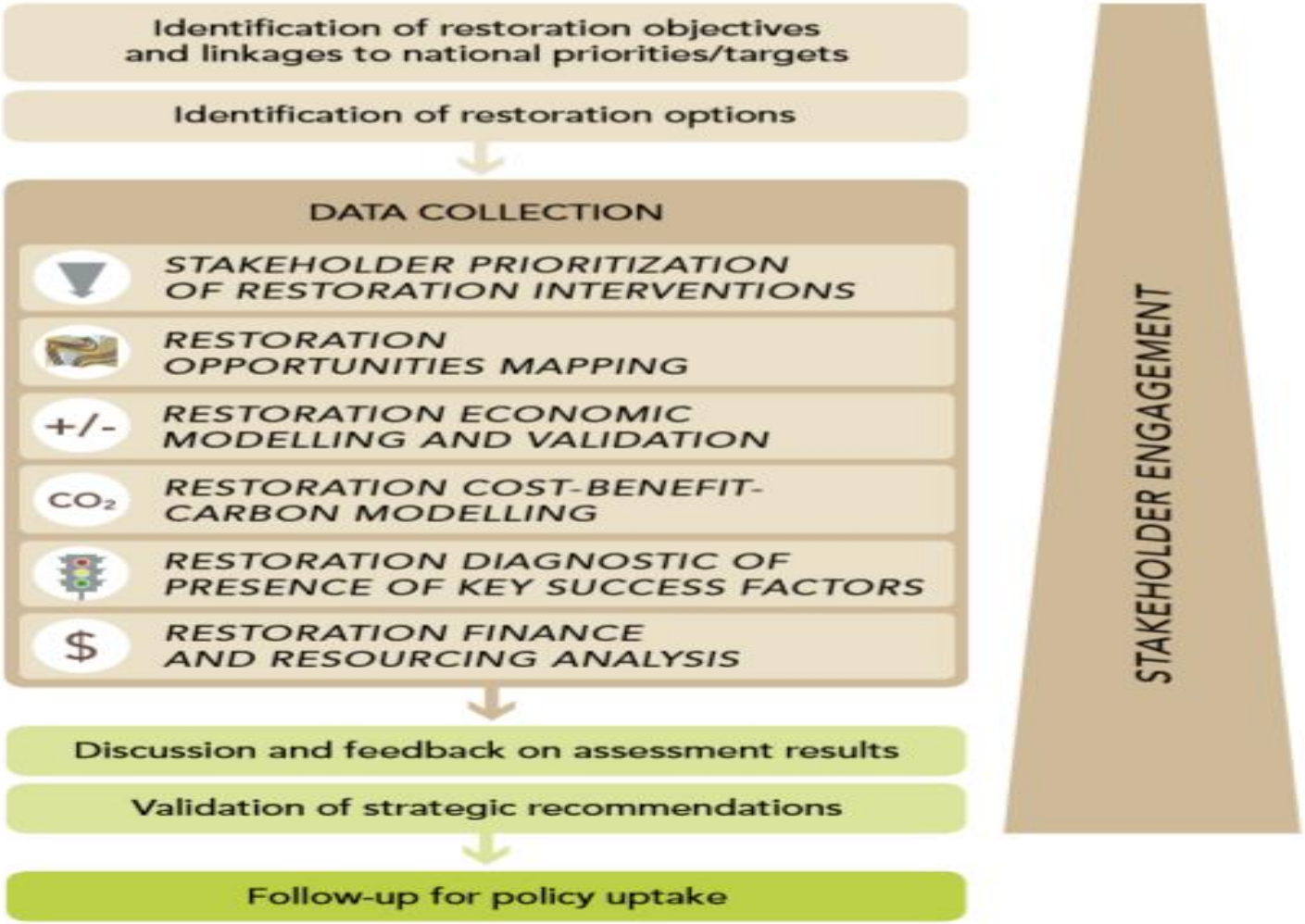
- Shrimp aquaculture in the national park started in 1995. Satellite data show major mangrove degradation from 2010 to 2015 (KibAS 2016)
- Other drivers include timber logging and infrastructure development, e.g. port development in Tanjung Api-api economic exclusive zone.
- These threats led to significant carbon loss, Ramsar habitat loss, as well as habitat fragmentation of critically endangered Sumatran tiger (KibAs 2016). The latter triggers conflict with local people (Mongabay, 2018).

AQUACULTURE ; NATIONAL VERSUS LOCAL CONTEXT

- Massive shrimp pond development (aquaculture) across Indonesia occurs as part of blue revolution, threatening mangrove ecosystem (FAO, 2016).
- National income from shrimp export is almost 40 % from the total income of fisheries sector (KKP, 2014)
- Mangrove loss in Sembilang was triggered primarily by pond development of illegal trans-migrants (KibAs, 2016; Silvius et al., 2016).
- Conversion to shrimp ponds had received permission from the local government especially the head of village and sub-district.

The Restoration Opportunities Assessment Methodology (ROAM), developed by WRI and IUCN, is introduced to help determine potential restoration sites

ROAM provides analytical input of potential restoration interventions



Restoration Diagnostic Study of Key Success Factors Presence

Table 20.
Diagnosing the key success factors

Step	1. Select the scope	2. Assess status of key success factors	3. Identify strategies to address missing factors
Activity	Choose the "scope" or boundary within which to apply the diagnosis. The selected scope will be the "candidate landscape".	Systematically evaluate whether or not key success factors for forest landscape restoration are in place for the candidate landscape.	Identify strategies to close gaps in those key success factors that are currently not in place in the candidate landscape.
End product	Candidate landscape for conducting diagnosis	List of missing (partially or entirely) key success factors	Set of strategies
Estimated time	A few days	1-2 weeks	1-2 weeks

Table 21.
One output of the diagnostic of key success factors in the Rwanda assessment

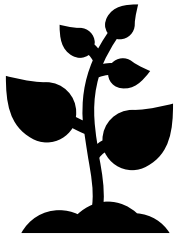
Theme	Enabling condition	Key success factor	Current status
Motivate	Benefits	Restoration generates economic benefits	In place
		Restoration generates social benefits	Partly in place
		Restoration generates environmental benefits	Partly in place
	Awareness	Benefits of restoration are publicly communicated	In place
		Opportunities for restoration are identified	Partly in place
	Crisis events	Crisis events are leveraged	Partly in place
	Legal requirements	Law requiring restoration exist	In place
		Law requiring restoration is broadly understood and enforced	Not in place
Enable	Ecological conditions	Soil, water, climate, and fire conditions are suitable for restoration	In place
		Plants and animals that can impede restoration are absent	In place
		Native seeds, seedlings or source populations are readily available	Not in place
	Market conditions	Competing demands (e.g., food, fuel) for degraded forestlands are declining	Not in place
		Value chains for products from restored area exists	Not in place
	Policy conditions	Land and natural resource tenure are secure	Partly in place
		Policies affecting restoration are aligned and steamlined	In place
		Restrictions on clearing remaining natural forests exist	Partly in place
		Forest clearing restrictions are enforced	In place
	Social conditions	Local people are empowered to make decisions about restoration	Not in place
		Local people are able to benefit from restoration	Partly in place
	Institutional conditions	Roles and responsibilities for restoration are clearly defined	Not in place
		Effective institutional coordination is in place	Not in place
Implement	Leadership	National and /or local restoration champions exist	Partly in place
		Sustained political commitment exist	In place
	Knowledge	Restoration "know how" relevant to candidate landscapes exists	In place
		Restoration "know how" transferred via peers or extension services	Not in place
	Technical design	Restoration design is technically grounded and climate resilient	Not in place
	Finance and incentives	Positive incentives and funds for restoration outweigh negative incentives	In place
		Incentives and funds are readily accessible	Not in place
	Feedback	Effective preformance monitoring and evaluation system is in place	Not in place
		Early wins are communicated	In place

In place Partly in place Not in place

KEY FACTORS FOR MANGROVE RESTORATION PROJECTS IN S. SEMBILANG NATIONAL PARK

Capacity

Some of the native community have been managing and utilizing the mangrove resources for many years long time before the designation of the national park



Native Seedlings Availability

Primary native species which produce seeds and seedlings abound

Alternative Livelihood

Wild fisheries and its supply-chain

KEY CHALLENGES FOR MANGROVE RESTORATION IN SUNGAI SEMBILANG

Physical Environment Suitability

Previous mangrove restoration and plantation programs are not properly protected due to lacking of attention to tidal hydrology or salinity gradients (e.g ex ponds)

Tenurial Security

The trans-migrant, private companies, and the national park authority claims it right tenures belonging to them. In addition, the local government permitted the ponds

Cross-Institutional Consolidation

Different stakeholders might have different approaches. To illustrate KHLH and KKP have the same authority in certain role. Forestry Ministry regulation No : P.44/Menhut-II/2012 about the establishment of forest area and Marine and fishery regulation : PER.17/MEN/2008 about PAs in coastal region and small island

Potential economic impact of restoration at the abandoned/disused shrimp ponds

- Fisheries
  - Linking existing Sembilang supply-chain of fisheries to market in Bangka and Palembang

- Wildlife Tourism
  - Birds tourism exists currently
  - The governor has asked the head of Sunsang village to recommend potential site in the national park as tourism destination
  - Wildlife Eco-tourism might be potential in pristine areas

CONCLUSION

- Degradation of mangrove in Indonesia including in Sungai Sembilang National Park can be solved through Protected Area Management
- Aquaculture and urban development are the main drivers of mangrove degradation in national and local context which is not excluding the in national park
- ROAM is strategic assessment method and methodology to apply study on the potential restoration sites globally, nationally, and locally
- Despite some challenges of mangrove restoration planning in the national park, a number of key factors or opportunities can feasibly make the restoration succeed
- Wild fisheries and wildlife tourism might be the best scenarios after the restoration is being implemented

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